

THE LAND AND FRESHWATER MOLLUSCS OF TROPICAL SOUTH AUSTRALIA.

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The land snails of Tropical South Australia are confined to the basin of the northern rivers—to that well-marked natural region which extends from the seaboard to the escarpment of the “Desert Sandstone” plateau, inasmuch as no species has up to the present time been recorded from the extensive tract of country lying north of the MacDonnell Ranges, on the verge of the tropics, to within about one hundred miles of the coast of Arnheim Land.

That the Desert Sandstone, presumably of Miocene age, extended to the seaboard will be readily conceded by those who have studied the physiographic features of the northern part of Arnheim Land; and therefore, the region of the northern rivers, occupied by metamorphic rocks, is as a land-surface of recent date. The area of the “basin of the northern rivers” is rapidly enlarging by the removal of the “desert sandstone,” by issue of water at its junction with the schistose rocks, thus originating the numerous affluents of the several large rivers of this well-watered portion of North Australia.

The very large number of immigrant plant species and genera in this region points, likewise, to a more modern origin of its flora as compared with that of the plateau of the Desert Sandstone.

We need not, then, wonder at the paucity of its land snails, whose means of dispersal are so limited, or even at the absence of those genera so characteristic of Tropical Polynesia and N.E. Australia. The climatic phenomena are, moreover, unfavourable to the establishment of species requiring shade and humidity; and the absence of land snails, over the area of the “desert sandstone” and the country to the south with which it is physically and geographically connected, must be attributed to aridity of soil and want of shelter in the form of trees or rocks. Nevertheless, it is not improbable that some species will be discovered in those insular-like masses of old rocks constituting the Ashburton, Forster’s, and other Ranges.

The number of species of land mollusca now known from the region of the northern rivers is eight, distributed generically as follows:—*Helix* six, *Bulimus* one, and *Stenogyra* one. Six of these are either specifically identical or closely allied to extra-limital species. The *Helices* are considered peculiar to the country, but with the exception of two of them no critical comparisons seem to have been instituted. *H. pomum*, the most widely diffused, is very closely related to *H. pachystyla* of N.E. Queensland; and *H. Meadei* and *H. Lyndii* are also near allies. *H. prunum* has an analogue in *H. argillacea* of Timor, but on the other hand, it is questionably distinct from *H. Coxeni* from Whitsunday Island, off Port Denison, Queensland; and *H. Bennetti* from Ipswich, Queensland, is another critical species of the same group. The facts are few, but almost warrant the inference that the Northern Territory *Helices* are forms of Queensland species modified in the course of their migration. The other land pulmonates are *Bulimus Beddomei*, previously known from Torres Straits, and *Stenogyra Tuckeri*, of Polynesian, if not of American origin, and probably an alien.

The freshwater shells are fairly well represented specifically, and include a greater number of endemic species than might have been expected. Almost every perennial water-course or lagoon has its molluscan denizens. But just as there are two well-marked geographical regions in tropical South Australia, so do we find a corresponding difference in the freshwater shells of the two regions.

The central portion of the continent yields *Unio Stuartii*, *Paludina Waterhousei*, and *P. Kingii*.

The basin of the Roper, *Unio Angasi*; that of the Adelaide, several *Limnæa*, *Bulinus*, *Planorbis*, *Paludina*, *Unio*, *Corbicula*, and one species of each of *Physopsis*, *Ancylus*, and *Neritina*; that of the Lower Victoria River, *Melaniæ*, a *Paludina*, a *Bulinus*, a *Bithinia*, a *Corbicula*, and a *Mycetopus*, nearly all specifically peculiar.

Several of the species have a wide range throughout the eastern half of the continent, and, with two exceptions, the genera are of world-wide distribution. *Mycetopus* has its head quarters in tropical America, but a species is known from Siam. *Physopsis* includes another species belonging to South Africa. The Australian representatives of these genera are confined within narrow limits. *Mycetopus* in one species is only known from the lower Victoria River, and *Physopsis* from the basin of the Adelaide River and Coburg Peninsula.

Helix pomum, Pfeiffer.

Reference.—Cox, *Monograph Australian Land Shells*, p. 40, t. 4, f. 7, 1868.

Synonym.—*H. pseudo-Meadei*, Brazier in *Harcus's S. Aust. Handbook* (name only).

This species is peculiar to Arnheim Land, though closely allied to *H. pachystyla*, Pfr., which ranges along the whole of the north-east coast of Australia. It was first obtained by MacGillivray, at Port Essington, and has since been collected in the Port Darwin district. I found it widely, but sparsely distributed over the country from Palmerston southwards to Pine Creek; it was only in the jungles near the coast that it seemed to be at all plentiful.

H. pseudo-Meadei was proposed for individuals of *H. pomum*, which exhibit a stippled ornament on the columella and callus development overspreading the body-wall of the aperture of the shell. As this character belongs to adult shells and there are no co-ordinate peculiarities, the specific name should be suppressed; it is, moreover, inaptly chosen.

Helix Meadei, Brazier.

Ref.—*Proc. Zool. Soc.*, p. 662, 1870.

Syn.—*H. Edwardsi*, Cox, *Mon.*, p. 109, t. 19, f. 3 (non Bland).

Habitat.—Banks of the Liverpool River (Cadell Expedition).

Helix Lyndii, Angas.

Ref.—*Proc. Zool. Soc.*, 1872, p. 610, t. 42, f. 1.

Hab.—Port Essington.

Helix prunum, Ferussac.

Ref.—Cox, *Mon. Aust. Land Shells*, p. 43, t. 4, f. 6.

Hab.—This species affects the sea coast, and has been collected at Port Essington on the bark of *Melaleuca* by MacGillivray, and at Palmerston by Bednall. I found many examples around Palmerston creeping about in the early morning after rains, but inland it occurred to me in single specimens at Run Jungle and at the Stapleton River, 26 and 42 miles respectively from Southport.

Remarks.—The periostracum of the young shell is raised into short bristles, and traces of them may be seen in some individuals just prior to attaining their full size. Except in the larger size and deciduous bristles, I fail to note any other difference between this species and *H. Coxeni*, from Queensland.

Helix Creedii, Cox.

Ref.—*Mon. Aust. Land Shells*, p. 110, t. 19, f. 2.

Hab.—Cadell's Straits (Cadell Exped., 1867).

Helix Wesselensis, Cox.

Ref.—*Op. cit.*, p. 110, t. 19, f. 4.

Hab.—Wessel Islands (Cadell Exped.).

Helix Gaertneriana, Pfr., recorded in Cox's Monograph as from Port Essington, belongs to the Aru Islands, and is not Australian (*teste* Brazier).

Bulimus Beddomei, Brazier.

Ref.—*Proc. Linnean Soc., N.S.W.*, vol. iv., p. 395, 1880.

Hab.—On trees, under the loose bark, Fanny Bay, Port Darwin (Mr. E. Spalding). Also known from Mt. Ernest Id., Torres Straits (*Beddome*).

B. Beddomei is doubtfully distinct from *B. Macleayi* of the same author, which extends to Yule Id., New Guinea.

Stenogyra Tuckeri, Pfr., *sp.*

Ref.—*Bulimus Tuckeri*, Pfr.; Cox, *Mon. Aust. Land Shells*, p. 69, t. 13, fig. 9.

“Generally distributed throughout Queensland and its islands from Brisbane to Cape York. Found generally in the isles of the S.W. Pacific, and has been introduced to Sydney with plants from Aneiteum.”—MacGillivray, in Cox, *op. cit.*, p. 70.

Hab.—At the bases of papaya trees, Palmerston (Inspector Foelsche).

I refer this species to the tropical American genus *Stenogyra*, of Shuttleworth, and on comparison with specimens find it not readily separable from *S. mimosarum*, D'Orb (*Bulimus*).

GENUS LIMNÆA.

The following species and *L. Lessoni*, Deshayes, are usually referred to the genus *Amphipeplea*, but without knowledge of the contained animals. With respect to the generic position of the last-named species, Mr. E. A. Smith, in *Proc. Lin. Soc.*, London, 1882, p. 272, writes:—“It is very doubtful whether this species is a true *Amphipeplea*, upon which subject Martens (*Ann. and Mag. Nat. Hist.*, 1866, vol. xvii., p. 212) offers some very interesting remarks.” I am not able to consult the reference alluded to in the foregoing quotation, but having examined the animal of *Amphipeplea Melbourneensis*, Pfr., now included among the synonyms of *L. Lessoni*, I can confidently assert that it is a *Limnæa*, and not an *Amphipeplea*; so also is a species inhabiting the Lower Murray River, which is with difficulty separable from the tropical *L. vinosa*. From analogy of shell-form, it may therefore be inferred that the Northern Territory species, which have a very close agreement one with

another, belong to *Limnæa* rather than to *Amphipeplea*. Personal examination of six species inhabiting the southern part of Australia has elicited the fact that one only, *A. papyracea*, mihi, has the mantle peculiarities of *Amphipeplea* (see Trans. of this Soc., vol. iv., p. 140, and Proc. Lin. Soc., N.S.W., vol. vi., p. 553).

Limnæa Phillipsi, *A. Adams and Angas.*

Ref.—*Proc. Zool. Soc.*, 1863, p. 416; *Reeve, Icon. Conch.*, t. 6, f. 41, 1872.

Hab.—Arnheim Land (Stuart's Expedition).

Limnæa vinosa, *Adams and Angas.*

Ref.—*Proc. Zool. Soc.*, 1863, p. 415; *Reeve, op. cit.*, t. 6, f. 37.

Hab.—Mary River, Arnheim Land (Stuart's Exped.).

Limnæa Angasi, *Sowerby.*

Ref.—*Reeve's Icon. Conch.*, t. 2, f. 11, 1872.

Hab.—Port Darwin.

GENUS BULINUS.

The sinistral spiral pond-snails of Australia have been placed (incorrectly so, I believe) in the genus *Physa*. The thick periostracum of most of them, which in many is prolonged into cilia or bristles, is incompatible with a largely-reflexed mantle. I have not examined all the Australian so-called *Physæ*, but in no instance have I found those distinctions which characterise *Physa* as separable from *Bulinus*. The mantle margin is neither expanded nor digitate; in *A. tenuistriata*, however, it has three small serratures on the columella side. Of the Northern Territory species, I have seen alive only *B. concinnus* and *B. Reevei*, which present the characters proper to *Bulinus*. According to Binney, "Fresh-water Shells of N. America, 1865," Adanson's name, *Bulinus*, has priority over *Aplexa*, Fleming, and is accompanied by a careful description and excellent figure.

Bulinus Hainesii, *Tryon.*

Ref.—*American Journ. Conch.*, vol. ii, t. 2, f. 9, p. 9, 1866 (Isidora).

Syn.—*Physa latilabiata*, *Sowerby, Reeve's Icon. Conch.*, t. 5, f. 33, 1873.

Hab.—Victoria River.

Bulinus ferrugineus, *Adams and Angas.*

Ref.—*Pro. Zool. Soc.*, p. 416, 1863; *Reeve, Icon. Conch.*, t. 4, f. 25 (Physa).

Hab.—Mary River, Arnheim Land (Stuart Exped.).

Bulinus concinnus, Adams and Angas.

Ref.—*Pro. Zool. Soc.*, p. 417, 1863 (Physa); *Reeve, Icon. Conch.*, t. 5, f. 35; *Smith, Pro. Lin. Soc.*, vol. 16, p. 281, t. 6, f. 13-14, 1882.

Hab.—Arnheim Land (Stuart Exped.), Pond at "The Gums," twelve miles south from Bridge Creek, Arnheim Land. (R. T.)

Bulinus olivaceus, Adams and Angas.

Ref.—*Pro. Zool. Soc.*, p. 416, 1863 (Physa); *Reeve, Icon. Conch.*, t. 5, f. 34; *Smith, loc. cit.*, p. 281, t. 6, f. 15.

Hab.—Arnheim Land (Stuart Exped.).

Bulinus exaratus, E. A. Smith.

Ref.—*Loc. cit.*, p. 292, t. 6, f. 28, 1882 (Physa).

Hab.—Port Essington.

Bulinus badius, Adams and Angas.

Ref.—*Pro. Zool. Soc.*, p. 416, 1863 (Physa); *Reeve, Icon. Conch.*, t. 7, f. 51.

Hab.—Mary River, Arnheim Land (Stuart Exped.).

Bulinus proteus, Sowerby.

Ref.—*Reeve's Icon. Conch.*, t. 6, fig. 43 (Physa).

Hab.—Adelaide River (Brit. Mus.).

Bulinus Bonus Henricus, Adams and Angas.

Ref.—*Proc. Zool. Soc.*, p. 417, 1863 (Physa); *Reeve, Icon. Conch.*, t. 5, f. 38; *E. A. Smith, loc. cit.*, t. 6, f. 29, p. 293.

Hab.—Arnheim Land (Stuart Exped.).

Bulinus Cumingi, H. Adams.

Ref.—*Proc. Zool. Soc.*, p. 144, 1861 (Ameria); *Reeve, Icon. Conch.*, t. 6, f. 44 (Physa).

Hab.—Port Essington.

Bulinus Reevei, Adams and Angas.

Ref.—*Proc. Zool. Soc.*, 1863, p. 417 (Ameria); *Reeve, Icon. Conch.*, t. 6, f. 40 (Physa.)

Hab.—Arnheim Land (Stuart Exped.). Ponds by the River Adelaide, and between Howley and Yam Creeks (R.T.). Also in Yam Creek by Glencoe (J. B. Robinson, coll. Brazier and Bednall).

Physopsis Jukesii, H. Adams.

Ref.—*Proc. Zool. Soc.*, 1861, p. 144; *Reeve, Icon. Conch.*, t. 9, f. 71.

Hab.—Port Essington (Jukes, Fly Exped.). Yam Creek by Glencoe (J. B. Robinson, coll. Brazier and Bednall).

Planorbis Essingtonensis, E. A. Smith.

Ref.—*Proc. Lin. Soc.*, vol. xv., p. 294, t. 6, figs. 33-35.

Habitat.—Freshwater lagoons, Point Smith, near Port Essington (*Brit. Mus.*); on submerged plants, River Adelaide (R.T.).

Planorbis meniscoides, *spec. nov.*

Shell shining, pellucid, yellow-horn colour, with a sunken spire, and flattened base; umbilicus deep and narrow. Last whorl obliquely convex above the angulated periphery. Whorls four, convex, separated by a deep suture. Surface marked by strong sigmoidal striæ and folds of growth coincident with the outline of the margin of the aperture, which is very oblique.

This species resembles *Segmentina Victoriae*, Smith, *Proc. Lin. Soc.*, 1882, p. 296, pl. 7, figs. 11-13, from which it differs by its smaller umbilicus, flatter base, and less convexity of the upper surface.

Greatest diameter, 4.5 millim.; smallest diameter, 4, nearly; height, 1.5.

Hab.—Buffalo Swamp, Port Darwin (coll. Mr. Brazier).

Ancylus australicus, Tate.

Ref.—*Trans. Roy. Soc. S. Aust.*, vol. iii., p. 102, t. 4, f. 4, 1880; id. *Smith, P.L.S.*, t. 7, figs. 36-37, 1882.

Hab.—River Adelaide; a single specimen, but lost before comparison with type examples (R. T.). The two examples of an *Ancylus* in the British Museum from Comet Creek, Queensland (Leichardt Exped., 1844) seem to be correctly referred to this species.

Melania australis, Lea.

Ref.—*Proc. Zool. Soc.*, 1850, p. 185; *Reeve, Icon. Con.*, t. 12, f. 82.

Hab.—River Victoria (N. - Aust. Exped., 1855); Port Essington (*Brit. Mus.*).

Melania carbonata, Reeve.

Ref.—*Icon. Con.*, fig. 88, 1859.

Hab.—Port Essington (*Brit. Mus.*).

Melania venustula, Brot.

Ref.—*Con. Cab.* ed. 2, p. 331, t. 34, fig. 5, 1874; *Smith, Proc. Lin. Soc.*, 1882, t. 5, figs. 9-10, p. 260.

Hab.—River Victoria (N. Aust. Exped.).

Melania onca, A. Adams and Angas,

Ref.—*Proc. Zool. Soc.*, 1863, p. 415; id. *Brot, op. cit.*, p. 330, t. 34, f. 7.

Hab.—Mary River, Arnheim Land (Stuart Exped.); River Adelaide (R. T.).

Melania Elseyi, *E. A. Smith*.

Ref.—*Proc. Linnean Soc.*, 1882, vol. xvi., p. 261, t. 5, f. 12.

Hab.—Australia, probably Victoria R. (N. Aust. Exped.).

Melania Balonnensis, *Conrad*.

Ref.—*American Jour. Conch.*, vol. ii, p. 80, t. 1, f. 10; *Smith, op. cit.*, t. 5, f. 1-3, p. 257.

Hab.—Australia, probably Victoria River (J. R. Elsey).

Paludina Essingtonensis, *Shuttleworth*.

Ref.—*Frauenfeld, Zool-botan. Gess., Wien*, 1862, p. 1, 169.

Syn.—*Vivipara suprafasciata*, *Tyron, Am. Jour. Conch.*, t. 11, f. 71, 1863.

Hab.—Port Essington (MacGillivray); Victoria R. (N. Aust. Exped.).

Paludina australis, *Reeve*.

Ref.—*Icon. Con.*, t. 11, f. 71, 1863.

Syn.—*P. ampullaroides*, *Hanley in Reeve, Icon. Con.*, f. 30; *P. affinis*, *Martens, Ann. Mag. Nat. Hist.*, 1865.

Hab.—Port Essington (Capt. Wickham); Victoria R. (N. Aust. Exped.); Depot Creek, ten miles south from R. Adelaide; and lagoons by The Gums, twelve miles south from Bridge Creek, Arnheim Land (R.T.); Yam Creek at Glencoe (Mr. J. B. Robinson, coll. Mr. Bednall).

Paludina tricineta, *E. A. Smith*.

Ref.—*Proc. Linn. Soc.*, 1882, vol. xvi., p. 265, t. 7, f. 16 (Paludina).

Hab.—North Australia [probably Victoria R.] (J. R. Elsey, N. Aust. Exped.).

Paludina dimidiata, *E. A. Smith*.

Ref.—*Loc. cit.*, t. 7, f. 17 (Vivipara).

Hab.—Victoria River (N. Aust. Exped.).

Paludina Waterhousei, *A. Adams and Angas*.

Ref.—*Proc. Zool. Soc.*, 1863, p. 414; *Smith, Proc. Lin. Soc.*, 1882, t. 7, f. 14 (Vivipara).

Hab.—Newcastle Waters (Stuart Exped.).

Paludina Kingii, *Adams and Angas*.

Ref.—*Proc. Zool. Soc.*, 1863, p. 415; *Smith, P.L.S.*, 1882, t. 7, f. 15 (Vivipara).

Hab.—King's Ponds (Stuart Exped.).

Bithinia Smithii, *Tate*.

Syn.—*B. australis*, *Smith, Proc. Lin. Soc.*, 1882, p. 267, t. 7, f. 13; non, *Tate and Brazier, Proc. Lin. Soc.*, N.S.W., 1881, p. 562.

Hab.—Victoria River (N. Aust. Exped.).

The genus *Gabbia* was founded on an erroneous interpretation of the characters of a freshwater shell from New South Wales. "Shell like *Amnicola*; operculum, *paucispiral* and calcareous." "The figure of the unique species *G. australis*, Tryon, Am. Journ. Conch., 1865, p. 220, t. 22, f. 7, reminds us of *Bithinia* rather than any other genus, for in it the operculum is represented as decidedly concentric, although said to be paucispiral in the description" (Stimpson, on the Hydrobiinæ, p. 56).

Later, Mr. Brazier described a shell from New South Wales as *Bithinia hyalina*. An examination of typical specimens proves the correctness of the generic position assigned, but a comparison with the figure of *Gabbia australis* leaves no doubt as to the specific identity of the two. The shell has, therefore, been catalogued by Messrs. Tate and Brazier as *Bithinia australis*, Tryon, sp.; consequently a new name must be given to the *B. australis* of Mr. Smith, and I have much pleasure in proposing that of *Smithii*, after its original describer.

Neritina crepidularia, Lamarck.

Ref.—Reeve, *Icon. Con.*, t. 8, f. 38.

Hab.—Port Essington (Capt. Wickham and J. B. Jukes).

Corbicula ovalina, Deshayes.

Ref.—*Proc. Zool. Soc.*, 1854, p. 343; *Smith, Proc. Lin. Soc.*, 1882, p. 299, t. 7, figs. 24-25.

Hab.—Port Essington. Adelaide River (R.T.), a doubtful identification.

Corbicula Deshayesii, E. B. Smith.

Ref.—*Op. cit.*, p. 303, t. 7, figs. 28-29.

Hab.—Victoria River and Port Essington.

Unia Stuartii, Adams and Angas.

Ref.—*Proc. Zool. Soc.*, 1863, p. 417 (*Alasmodon*); *Reeve, Icon. Con.*, t. 54, f. 279 (*Anodon*).

Hab.—Newcastle Waters (Stuart Exped.); also in extra-tropical Central Australia.

Remarks.—I do not know why this shell was placed under *Alasmodon*. In all stages of growth all the teeth are developed, all are laminar, elongated, and slightly crenulated on the margin; anterior 2.1, posterior 1.2. A large example from Newcastle Waters has the following dimensions:—Length, 107; breadth, 52; thickness, 30; anterior side, 28; posterior side, 79 millimetres.

Unio Bednalli, spec. nov.

Transversely elongate-oblong, about twice as long as broad; thin, sub-compressed. Epidermis thick, dark brown, radially striated, and concentrically striated between the folds of growth, wrinkled in the flattish postero-dorsal region. Umbones, at about the anterior third, moderately inflated; anterior margin rounded, ventral nearly straight, posterior obliquely truncate. Teeth as in *U. Stuartii*. Interior of valves iridescent bluish, radiately striated. Length, 79; breadth, 40; thickness, 30; anterior side, 23; posterior, 56 millimetres.

Hab.—River Adelaide, at the ford (R.T.); Yam Creek, at Glencoe (Mr. J. B. Robinson, coll. Mr. Bednall).

Remarks.—*U. Bednalli* is related to *U. Stuartii*, from which it differs in being more tumid, less inequilateral, and in its truncated, not acuminate, posterior margin. The epidermis of young shells of *U. Stuartii* is of a pale brown colour, whilst that of *U. Bednalli* is always blackish-brown.

I have much pleasure in naming this form after Mr. W. T. Bednall, to whom science is indebted for bringing to notice many interesting marine species from the Northern Territory and other parts of Australia.

Unio Angasi, Reeve.

Ref.—*Icon. Conch.*, t. 55, f. 282, 1867.

Hab.—Strangway's River, tributary of the Roper (Stuart Exped.).

Unio (aff.) Angasi.

Hab.—Ponds by the River Adelaide at the ford and tributaries of the River McKinlay (R.T.).

This form differs from *Angasi* in being more depressed and more arched behind the umbones; the interior is bluish iridescent. Leichardt recorded Unios from the South Alligator River, "smaller than those in the Roper;" these may belong to the same species inhabiting the McKinlay River.

Mycetopus rugatus, Sowerby.

Ref.—*Reeve's Icon. Conch.*, t. 17, f. 7; *E. A. Smith* in "Voyage Erebus," t. 4, f. 1.

Hab.—Victoria River (Capt. Wickham).

